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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,038	11/19/2003	Hisao Sasai	2003_1660A	5559

513 7590 09/12/2007
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EXAMINER	
SENFI, BEHROOZ M	
ART UNIT	**PAPER NUMBER**
2621	
MAIL DATE	**DELIVERY MODE**
09/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,038	SASAI ET AL.	
	Examiner	Art Unit	
	Behrooz Senfi	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *4,6-12,18-21,28-32,34,35,37,39,41,42,44 and 46* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,13-17,22-27,33,36,38,40,43 and 45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/7/04,7/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1 – 3, 5, 13 – 17, 22 – 27, 33, 36, 38, 40, 43 and 45 in the reply filed on 06/11/2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

2. Claims 16 and 17 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot be dependent to another multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 16 – 17 are not been further treated on the merits.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 40, 43 and 45 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding claim 40, it is noted that, the claim invention "an interpolation frame generation program" for performing an interpolation frame generation method for generating an interpolation frame for interpolating image frames, by it self does not have functionality: Since it fails to convey that, the program is a computer program embedded

or stored on a computer readable medium to be executed by the computer; in order to comply with the requirement of MPEP 2106.01.I and the Interim Guidelines for Examination of Patent Application for Patent Subject Matter Eligibility (Official Gazette notice of 22 November 2005), and therefore does not fall within one of the four statutory classes of § 101.

Regarding claims 43 and 45, it is noted that, the claim invention "an interpolation frame generation program" for performing an interpolation frame generation method for generating an interpolation frame for interpolating image frames by using a computer, by it self does not have functionality: Since it fails to convey that, the program is a computer program embedded or stored on a computer readable medium to be executed by the computer; in order to comply with the requirement of MPEP 2106.01.I and the Interim Guidelines for Examination of Patent Application for Patent Subject Matter Eligibility (Official Gazette notice of 22 November 2005), and therefore does not fall within one of the four statutory classes of § 101.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 – 3, 33 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Sharma et al. (US 6,192,079).

Regarding claim 1, Sharma '079 discloses, an interpolation frame generation device for generating an interpolation frame (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma) for interpolating image frames that are obtained by decoding a coded image signal (e.g. as illustrated in figs. 1 and 6 of Sharma, cols. 3 - 4, lines 66 – 22 and col. 5, lines 45 – 48; receiver 19, including frame rate up-sampler "FRU 20" integral with decoder "e.g. col. 4, lines 9" decodes the received coded image signal "e.g. fig. 1, receiver 19, receives the coded image signal from encoder/sender 8 through communication channel 10" for interpolating the image frames by decoding the coded image signal, of Sharma) that is coded by motion compensation (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and transmits the motion vectors as part of the video bit-stream/signal to be used to generate interpolated frames of Sharma), the device comprising;

motion compensation vector acquisition unit operable to acquire a motion compensation vector of a coded block that forms the coded image signal by decoding the coded image signal (please see; fig. 1, receiver 19, thus acquire a motion compensation vector of the coded block generated in encoding side to form the coded image signal and transmits to the decoder to decode the coded image signal as part of the video bit-stream and being used to generate interpolated frames, as discussed in col. 5, lines 21 – 37 and 45 – 48 of Sharma); and

interpolation frame generation unit operable to generate the interpolation frame (please see; fig. 1, frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" to generate the interpolation frame "e.g. interpolated frames, as illustrated in fig. 6" col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma) in accordance with at least a motion vector of an image block (e.g. col. 5, lines 45 – 48, indicating the use of motion vector "MV" of the image to generate the interpolated frames, also see fig. 3, using MV for interpolation of the frame) that forms an image frame by using the motion compensation vector of the coded block as the motion vector of the image block (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and the receiver "e.g. frame rate up-sampler (FRU 20) integral with decoder, as discussed earlier in the above action" uses the received motion compensation vector of the coded block as the motion vector of the image block to generate the interpolated frames, as illustrated in fig. 6, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma).

Regarding claim 2, Sharma '079 discloses, an interpolation frame generation device for generating an interpolation frame (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma) for interpolating image frames that are obtained by decoding a coded image signal (e.g. as illustrated in figs. 1 and 6 of Sharma, cols. 3 - 4, lines 66 – 22 and col. 5, lines 45 – 48; receiver 19, including frame rate up-sampler "FRU 20" integral with decoder "e.g. col. 4, lines 9" decodes the received coded image signal "e.g.

fig. 1, receiver 19, receives the coded image signal from encoder/sender 8 through communication channel 10" for interpolating the image frames by decoding the coded image signal, of Sharma) that is coded by motion compensation (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and transmits the motion vectors as part of the video bit-stream/signal to be used to generate interpolated frames of Sharma), the device comprising:

motion compensation vector acquisition unit operable to acquire a motion compensation vectors of coded blocks that forms the coded image signal by decoding the coded image signal (please see; fig. 1, receiver 19, thus acquire a motion compensation vector of the coded block generated in encoding side to form the coded image signal and transmits to the decoder to decode the coded image signal as part of the video bit-stream and being used to generate interpolated frames, as discussed in col. 5, lines 21 – 37 and 45 – 48 of Sharma); and

motion vector detection unit operable to detect at least a motion vector between a base frame and a reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, detection of motion vector between two frames, current frame (e.g., base frame) and previous frame (e.g., reference frame) of Sharma) the unit detecting the motion vector of an image block forming the base frame in a certain area of the reference frame that is determined in accordance with the motion compensation vector (please see; figs. 2 - 5 col. 5, lines 33 – 48, indicating motion estimation, detecting motion vector of the image block "e.g., block-based motion estimation" which is performed on a per block basis in

the current frame "e.g., base frame" with the matching block in the previous frame "e.g., reference frame" for motion compensated coding "e.g. motion compensation vector" of Sharma); and

interpolation frame generation unit operable to generate the interpolation frame in accordance with the detected motion vector (please see; fig. 1, receiver 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" to generate the interpolation frame "e.g. interpolated frames, as illustrated in fig. 6" in accordance with the detected motion vector transmitted as part of the video signal, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma)

Regarding claim 3, Sharma '079 discloses, an interpolation frame generation device for generating an interpolation frame (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma) for interpolating image frames that are obtained by decoding a coded image signal (e.g. as illustrated in figs. 1 and 6 of Sharma, cols. 3 - 4, lines 66 – 22 and col. 5, lines 45 – 48; receiver 19, including frame rate up-sampler "FRU 20" integral with decoder "e.g. col. 4, lines 9" decodes the received coded image signal "e.g. fig. 1, receiver 19, receives the coded image signal from encoder/sender 8 through communication channel 10" for interpolating the image frames by decoding the coded image signal, of Sharma) that is coded by motion compensation (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and transmits the motion

vectors as part of the video bit-stream/signal to be used to generate interpolated frames of Sharma), the device comprising;

image signal information acquisition unit operable to acquire image signal information of the coded image signal (please see; fig. 1, receiver 19 “e.g. image signal information acquisition unit” to acquire/receive image signal information of the coded image signal from the sender/encoder side “e.g. sender/encoder unit 8 of fig. 1” through communication channel 10 of Sharma);

motion vector detection unit operable to partially select at least an image block among the entire image blocks that form a base frame and to detect a motion vector of the partially selected image block between the base frame and a reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, motion estimation and motion compensation for detecting motion vector on a per block basis “e.g., per block basis; consider as partially select image block among the entire image blocks, since each block among the entire image blocks is being selected for motion vector processing” to detect a motion vector of the partially selected image block between two frames, the base frame “e.g., current frame” and a reference frame “e.g., previous frame” of Sharma);

and interpolation frame generation unit operable to generate the interpolation frame in accordance with the image signal information and the motion vector (please see; fig. 1, receiver 19 including frame rate up-sampler (FRU 20) integral with decoder to receive the image signal information transmitted from the encoder/sender unit 8 “e.g. fig. 1 of Sharma” and the motion vector transmitted as part of the image signal for

generating the interpolation frame "e.g. as illustrated in fig. 6, interpolated frames unit 116", col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma).

Regarding claim 33, Sharma '079 discloses, an interpolation frame generation method for generating an interpolation frame (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma) for interpolating image frames that are obtained by decoding a coded image signal (e.g. as illustrated in figs. 1 and 6 of Sharma, cols. 3 - 4, lines 66 – 22 and col. 5, lines 45 – 48; receiver 19, including frame rate up-sampler "FRU 20" integral with decoder "e.g. col. 4, lines 9" decodes the received coded image signal "e.g. fig. 1, receiver 19, receives the coded image signal from encoder/sender 8 through communication channel 10" for interpolating the image frames by decoding the coded image signal, of Sharma) that is coded by motion compensation (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and transmits the motion vectors as part of the video bit-stream/signal to be used to generate interpolated frames of Sharma), the method comprising;

an image signal information acquisition step for acquiring image signal information of the coded image signal (please see; fig. 1, receiver 19 "e.g. image signal information acquisition unit" to acquire/receive image signal information of the coded image signal from the sender/encoder side "e.g. sender/encoder unit 8 of fig. 1" through communication channel 10 of Sharma);

a motion vector detection step for partially selecting at least an image block among the entire image blocks that form a base frame and to detect a motion vector of the partially selected image block between the base frame and a reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, motion estimation and motion compensation for detecting motion vector on a per block basis "e.g., per block basis; consider as partially select image block among the entire image blocks, since each block among the entire image blocks is being selected for motion vector processing" to detect a motion vector of the partially selected image block between two frames, the base frame "e.g., current frame" and a reference frame "e.g., previous frame" of Sharma);

and an interpolation frame generation step for generating the interpolation frame in accordance with the image signal information and the motion vector (please see; fig. 1, receiver 19 including frame rate up-sampler (FRU 20) integral with decoder to receive the image signal information transmitted from the encoder/sender unit 8 "e.g. fig. 1 of Sharma" and the motion vector transmitted as part of the image signal for generating the interpolation frame "e.g. as illustrated in fig. 6, interpolated frames unit 116", col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma).

Regarding claim 40, Sharma '079 discloses, an interpolation frame generation for performing an interpolation frame generation method for generating an interpolation frame (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6, interpolated frames unit 116, is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48

of Sharma) for interpolating image frames that are obtained by decoding a coded image signal (e.g. as illustrated in figs. 1 and 6 of Sharma, cols. 3 - 4, lines 66 – 22 and col. 5, lines 45 – 48; receiver 19, including frame rate up-sampler "FRU 20" integral with decoder "e.g. col. 4, lines 9" decodes the received coded image signal "e.g. fig. 1, receiver 19, receives the coded image signal from encoder/sender 8 through communication channel 10" for interpolating the image frames by decoding the coded image signal, of Sharma) that is coded by motion compensation (please see; abstract, lines 9 – 13, col. 5, lines 25 – 27 and lines 35 – 37, indicating motion compensation taking place in encoder side to generate motion vector "MV" and transmits the motion vectors as part of the video bit-stream/signal to be used to generate interpolated frames of Sharma), the interpolation frame generation program making the computer execute the interpolation frame generation method. It is noted that the step and process of generating an interpolation frame for interpolating image frames by encoding and decoding of image frames of Sharma, is software/program implemented, which inherently calls for computer/processor program product; comprising:

an image signal information acquisition step for acquiring image signal information of the coded image signal (please see; fig. 1, receiver 19 "e.g. image signal information acquisition unit" to acquire/receive image signal information of the coded image signal from the sender/encoder side "e.g. sender/encoder unit 8 of fig. 1" through communication channel 10 of Sharma);

a motion vector detection step for partially selecting at least an image block among the entire image blocks that form a base frame and for detecting a motion vector

of the partially selected image block between the base frame and a reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, motion estimation and motion compensation for detecting motion vector on a per block basis "e.g. per block basis; consider as partially select image block among the entire image blocks, since each block among the entire image blocks is being selected for motion vector processing" to detect a motion vector of the partially selected image block between two frames, the base frame "e.g., current frame" and a reference frame "e.g., previous frame" of Sharma);

and an interpolation frame generation step for generating the interpolation frame in accordance with the image signal information and the motion vector (please see; fig. 1, receiver 19 including frame rate up-sampler (FRU 20) integral with decoder to receive the image signal information transmitted from the encoder/sender unit 8 "e.g. fig. 1 of Sharma" and the motion vector transmitted as part of the image signal for generating the interpolation frame "e.g. as illustrated in fig. 6", col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma).

7. Claims 13 – 15, 36 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishii (US 5,204,740).

Regarding claim 13, Ishii '740 discloses, an interpolation frame generation device for generating an interpolation frame for interpolating image frames (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 4, lines 19 –

35, indicating inter-frame interpolation and intra-frame interpolation), the device comprising:

generation process ability decision unit operable to decide generation process ability for generating the interpolation frame (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2, lines 21 – 24, col. 3, lines 18 – 29, indicating generation of interpolation frame based on the decision unit "e.g. ability" deciding if the image signal can be decoded or not, of Ishii); and

interpolation frame generation unit operable to generate the interpolation frame in accordance with a decision of the generation process ability decision unit (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2, lines 21 – 24, col. 3, lines 18 – 29 and col. 4, lines 19 - 35, indicating generation of interpolation frame based on the decision unit "e.g. ability" of Ishii).

Regarding claim 14, Ishii '740 discloses, the interpolation frame generation device (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 4, lines 19 – 35, indicating inter-frame interpolation and intra-frame interpolation), wherein the interpolation frame generation unit changes the number of interpolation frames in accordance with a decision of the generation process ability decision unit (please see; fig. 1, interpolation decision unit 24, adaptive interpolations 26 and 27, col. 3, lines 14 – 33 and col. 4, lines 19 – 35, where discloses the adaptive interpolation circuits 26 and 27 generates interpolation frame in accordance with a decision of the interpolation decision unit 24 and motion decision unit 20 and selects the inter-frame interpolation and/or intra-frame interpolation based on the decision, which

changes the number of interpolation frames in accordance with the selected mode, of Ishii).

Regarding claim 15, Ishii '740 discloses, the interpolation frame generation unit changes the number of image blocks that form an imager frame in which the motion vectors are detected in accordance with a decision of the generation process ability decision unit (please see; col. 3, lines 19 – 36, the selection of inter-frame and/or intra-frame interpolation for a block by adaptive interpolation circuit based on the interpolation decision circuit would change the number of image blocks that form an imager frame, of Ishii).

Regarding claim 36, Ishii '740 discloses, an interpolation frame generation method for generating an interpolation frame for interpolating image frames (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 4, lines 19 – 35, indicating inter-frame interpolation and intra-frame interpolation), the method comprising:

The generation process ability decision step for deciding the generation process ability for generating the interpolation frame (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2, lines 21 – 24, col. 3, lines 18 – 29, indicating generation of interpolation frame based on the decision unit "e.g. ability" deciding if the image signal can be decoded or not, of Ishii); and

an interpolation frame generation step for generating the interpolation frame in accordance with a decision in the generation process ability decision step (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2,

lines 21 – 24, col. 3, lines 18 – 29 and col. 4, lines 19 - 35, indicating generation of interpolation frame based on the decision unit "e.g. ability" of Ishii).

Regarding claim 43, Ishii '740 discloses, an interpolation frame generation method for generating an interpolation frame for interpolating image frames (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 4, lines 19 – 35, indicating inter-frame interpolation and intra-frame interpolation). The step and process of generating an interpolation frame for interpolating image frames of Ishii are software/program implemented, which inherently calls for computer program product.

generation process ability decision step for deciding generation process ability for generating the interpolation frame (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2, lines 21 – 24, col. 3, lines 18 – 29, indicating generation of interpolation frame based on the decision unit "e.g. ability" deciding if the image signal can be decoded or not, of Ishii); and

an interpolation frame generation step for generating the interpolation frame in accordance with a decision in the generation process ability decision step (please see; fig. 1, interpolation decision unit 24, adaptive interpolation circuits 26 and 27, col. 2, lines 21 – 24, col. 3, lines 18 – 29 and col. 4, lines 19 - 35, indicating generation of interpolation frame based on the decision unit "e.g. ability" of Ishii).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. (US 6,192,079) in view of Ishii (US 5,204,740).

Regarding claim 5, Sharma '079 teaches, the interpolation frame generation device receiving the transmitted image signal from the sender/encoder side and generating interpolation frame, and detection of motion vector of partially selected image block, as discussed with respect to claim 3 above (please see; fig. 1, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6, thus receives the transmitted image signal from the sender/encoder side and generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48, and figs. 3 – 5, col. 5, lines 33 – 48, motion estimation and motion compensation for detecting motion vector on a per block basis "e.g. per block basis; consider as partially select image block among the entire image blocks, since each block is being selected for processing of motion vector detection" for detection of motion vector, of Sharma).

Sharma '079 is silent in regards to explicit of, coding mode of a coded block that forms the coded image signal and intra block, as specifies in the claim.

Ishii '740 in the same field teaches (please see; fig. 1, col. 2, lines 11 – 24 and col. 3, lines 19 – 29, detection of intra block or inter block of Ishii) indicating decision means receiving the block characteristic information and a coded information (i.e.,

coding mode, intra or inter) signal on the block basis and based on the received information decides if the image signals can be decoded or not.

Since both references teaches image/frame decoding and interpolation, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to improve the image decoding of Sharma in accordance with the teaching of Ishii by detecting image motion at once and effecting an interpolation process in accordance with the detected image motion information to avoid long calculation time and minimize large number of calculation circuits, as suggested by Ishii (i.e. col. 1, lines 57 – 63, col. 2, lines 3 – 5).

10. Claims 22 – 26, 38 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. (US 6,192,079) in view of Demos (US 2004/0005004).

Regarding claim 22, Sharma '079 teaches, an interpolation frame generation device for generating an interpolation frame for interpolating image frames (please see; figs. 1 - 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), the device comprising:

motion vector detection unit operable to detect motion vectors by utilizing a plurality of first image frames (please see; figs. 2 – 5, col. 5, lines 33 – 60, detection of motion vector between plurality of first image frames "e.g. two successive frames of the sequence, previous and current frames" of Sharma); and

interpolation frame generation unit operable to generate the interpolation frame in accordance with the motion vectors (please see; fig. 1, frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" to generate the interpolation frame "e.g. interpolated frames, as illustrated in fig. 6" col. 4, lines 16 - 19 and col. 5, lines 45 – 48 in accordance with the encoded motion vectors, of Sharma).

Sharma '079 teaches detection of motion vector between two successive image frames (e.g., Previous frame and Current frame as shown in figs. 2 – 5), which are located before and after interpolated frame.

Although Sharma '079 teaches detection of motion vector between two successive image frames (e.g., Previous frame and Current frame as shown in figs. 2 – 5), Sharma '079 is silent in regards to explicit of "<u>plurality of image frames that are located either before or after the interpolation frame in the display order</u>".

However, Demos '004 in the same field teaches (please see; figs. 5 and 20 - 22, page 2, paragraphs 0025, 0030, page 4, paragraph 0051 and page 8, paragraphs 0120 – 0122) the use of plurality of image frames that are located either before or after the interpolation frame in the display order (i.e., noted in figs. 5 and 21, that <u>the plurality of "P" frames</u> are located before or after the interpolated "B" frames; see paragraphs 0005 and 0028).

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the video frame interpolation process of Sharma, in accordance with the teaching of Demos by using plurality of image frames as a reference frame which are located either before or after the

interpolation frame (i.e. B frame) in the display order, in order to improve the image quality of one or more predicted frames in a video image compression as suggested by Demos (i.e. page 2, paragraph 0020 of Demos).

Regarding claim 23, the combination of Sharma '079 and Demos '004 teaches, the interpolation frame generation device (please see; figs. 1 - 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), wherein the plurality of first image frames are located on one side of the interpolation frame in the display order (please see; figs. 5 and 20 - 22, page 2, paragraphs 0025, 0030, page 4, paragraph 0051 and page 8, paragraphs 0120 – 0122, indicating the use of plurality of image frames as a reference frames that are located on one side of the interpolation frame in the display order of Demos) and includes a plurality of base frames that serve as bases for detecting the motion vectors (please see; figs. 5 and 20 – 22, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating plurality of frames "e.g. base frames" that serves as bases for motion vectors detection of Demos);

one or a plurality of second image frames are located on another side of the interpolation frame in the display order (please see; figs. 2 – 3 of Sharma, illustrating the second image frame "e.g. current frame" located on another side of the interpolation frame in the display order "e.g. previous frame and current frame order" of Sharma; also fig. 21 of Demos, illustrating second image frames located on another side of the interpolation frame "e.g. frames P1, P2 and/or P4, P5 located on different side of the

interpolated frame B", page 2, paragraph 0030, page 3, paragraph 0031 and page 14, paragraph 0197 of Demos) and include a reference frame that serves as an object for detecting the motion vectors (please see; figs. 2 – 3 of Sharma, illustrating the reference frame "e.g., previous frame" that serves as an object for detecting the motion vector of Sharma, also figs. 5 and 20 – 22 of Demos, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating "e.g., base frames" that serves as reference frame for motion vectors detection of Demos); and

the motion vector detection unit detects the motion vectors between the base frame and the reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, detection of motion vector between two frames, current frame (e.g., base frame) and previous frame (e.g., reference frame) of Sharma, also figs. 12 – 18 and 21, page 1, paragraph 0009 of Demos, indicating methods of motion vector detection/prediction).

Regarding claim 24, the combination of Sharma '079 and Demos '004 teaches, the interpolation frame generation device (please see; figs. 1 – 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), wherein the plurality of first image frames are located on one side of the interpolation frame in the display order (please see; figs. 5 and 20 - 22, page 2, paragraphs 0025, 0030, page 4, paragraph 0051 and page 8, paragraphs 0120 – 0122, indicating the use of plurality of image frames as a reference frames that are located before or after the interpolation frame in the display order, i.e., noted in Figs. 5 and 21, that <u>the plurality of "P" frames</u> are located before or after the interpolated "B"

frame; see paragraphs 0005 and 0028 of Demos) and includes a plurality of reference frames that serve as reference for detecting the motion vectors (please see; figs. 5 and 20 – 22, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating plurality of frames as a reference frames that are located before or after the interpolation frame in the display order, i.e., noted in Figs. 5 and 21, that the plurality of "P" frames are located before or after the interpolated "B" frame; see paragraphs 0005 and 0028 that serves as bases for motion vectors detection of Demos);

one or a plurality of second image frames are located on another side of the interpolation frame in the display order (please see; figs. 2 – 3 of Sharma, illustrating the second image frame "e.g. current frame" located on another side of the interpolation frame in the display order "e.g. previous frame and current frame order" of Sharma; also fig. 21 of Demos, illustrating second image frames located on another side of the interpolation frame "e.g., frames P1, P2 and/or P4, P5 located on different side of the interpolated frame B", page 2, paragraphs 0028, 0030, page 3, paragraph 0031 and page 14, paragraph 0197 of Demos) and include a base frame that serves as an object for detecting the motion vectors (please see; figs. 5 and 21 – 22, page 2, paragraphs 0028, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating plurality of frames (e.g., base frames) that serves as base for motion vectors detection of Demos); and

the motion vector detection unit detects the motion vectors between the base frame and the reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, detection of

motion vector between two frames, current frame (e.g., base frame) and previous frame (e.g., reference frame) of Sharma, also figs. 12 – 18 and 21, page 1, paragraph 0009 of Demos, indicating methods of motion vector detection/prediction).

Regarding claim 25, the limitations claimed are substantially similar to claim 23 above, thus have been analyzed and rejected with respect to combination teaching of Sharma '079 and Demos '004, as below:

The combination of Sharma '079 and Demos '004 teaches, the interpolation frame generation device (please see; figs. 1 - 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), wherein the plurality of first image frames includes a plurality of base frames that serve as bases for detecting the motion vectors (please see; figs. 5 and 21 – 22, page 2, paragraph 0028, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating plurality of frames (e.g., base frames) that serves as bases for motion vectors detection of Demos) and a reference frame that serves as an object for detecting the motion vectors (please see; figs. 5 and 21 – 22, page 2, paragraph 0028, page 3, paragraphs 0033 - 0034, page 5, paragraphs 0067 – 0068 and page 8, paragraph 0120, indicating plurality of frames (e.g., base frames) that serves as reference frame for motion vectors detection of Demos); and

the motion vector detection unit detects the motion vectors between the base frame and the reference frame (please see; figs. 3 – 5, col. 5, lines 33 – 48, detection of motion vector between two frames, current frame (e.g., base frame) and previous frame

(e.g., reference frame) of Sharma, also figs. 12 – 18 and 21, page 1, paragraph 0009 of Demos, indicating methods of motion vector detection/prediction).

Regarding claim 26, Sharma '079 teaches, the interpolation frame generation device (please see; figs. 1 – 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), wherein the motion vector detection unit detects a first motion vector between a first base frame that serves as a base for detecting the first motion vector and a first reference frame that is located before the first base frame in the display order (please see; figs. 3 – 5, col. 5, lines 33 – 48, detection of motion vector "e.g. first motion vector" between two frames, current frame (e.g., base frame) and previous frame (e.g., reference frame), which is located before the base/current frames of Sharma).

Sharma '079 is silent in regards to explicit of, detects a second motion vector between a second base frame that serves as a base for detecting the second motion vector and a second reference frame that is located after the second base frame in the display order.

Demos '004 in the same field teaches detection of motion vectors (please see; fig. 22, illustrates detection of MV's between a second base frame (i.e., frame P5 consider as second base frame) and a second reference frame (i.e., subsequent P frame, P4) which is located after the second base frame "e.g. P5" in the display order, page 14, paragraph 0198 of Demos).

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to improve the video frame interpolation process of Sharma in accordance with the teaching of Demos, by detecting a second motion vector between a second base frame "P5" that serves as a base for detecting the second motion vector and a second reference frame that is located after second base frame in the display order "P4", in order to improve the image quality of one or more predicted frames in a video image compression as suggested by Demos (i.e. page 2, paragraph 0020 of Demos).

Regarding claim 38, Sharma '079 teaches, an interpolation frame generation Method for generating an interpolation frame for interpolating image frames (please see; figs. 1 - 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma), the method comprising:

a motion vector detection step for detecting motion vectors by utilizing a plurality of first image frames (please see; figs. 2 – 5, col. 5, lines 33 – 60, detection of motion vector between plurality of first image frames "e.g. two successive frames of the sequence, previous and current frames" of Sharma); and

an interpolation frame generation step for generating the interpolation frame in accordance with the motion vectors (please see; fig. 1, frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" to generate the interpolation frame "e.g. interpolated frames, as illustrated in fig. 6" col. 4, lines 16 - 19 and col. 5, lines 45 – 48 in accordance with the encoded motion vectors, of Sharma).

Sharma '079 teaches detection of motion vector between two successive image frames (e.g., Previous frame and Current frame as shown in figs. 2 – 5), which are located before and after interpolated frame.

Although Sharma '079 teaches detection of motion vector between two successive image frames (e.g., Previous frame and Current frame as shown in figs. 2 – 5), Sharma '079 is silent in regards to explicit of "plurality of image frames that are located either before or after the interpolation frame in the display order".

However, Demos '004 in the same field teaches (please see; figs. 5 and 20 - 22, page 2, paragraphs 0025, 0030, page 4, paragraph 0051 and page 8, paragraphs 0120 – 0122) the use of plurality of image frames that are located either before or after the interpolation frame in the display order (i.e., noted in figs. 5 and 21, that the plurality of "P" frames are located before or after the interpolated "B" frames; see paragraphs 0005 and 0028).

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the video frame interpolation process of Sharma, in accordance with the teaching of Demos by using plurality of image frames as a reference frame which are located either before or after the interpolation frame (i.e. B frame) in the display order, in order to improve the image quality of one or more predicted frames in a video image compression as suggested by Demos (i.e. page 2, paragraph 0020 of Demos).

Regarding claim 45, Sharma '079 teaches, an interpolation frame generation

for generating an interpolation frame for interpolating image frames (please see; figs. 1 - 3 of Sharma, device 19 including frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" as illustrated in fig. 6 is used for generating an interpolation frame, col. 4, lines 16 - 19 and col. 5, lines 45 – 48 of Sharma). The step and process of generating an interpolation frame for interpolating image frames of Sharma are software/program implemented, which inherently calls for computer program product.

a motion vector detection step for detecting motion vectors by utilizing a plurality of first image frames (please see; figs. 2 – 5, col. 5, lines 33 – 60, detection of motion vector between plurality of first image frames "e.g. two successive frames of the sequence, previous and current frames" of Sharma); and

an interpolation frame generation step for generating the interpolation frame in accordance with the motion vectors (please see; fig. 1, frame rate up-sampler (FRU 20) integral with decoder "e.g. col. 4, lines 9" to generate the interpolation frame "e.g. interpolated frames, as illustrated in fig. 6" col. 4, lines 16 - 19 and col. 5, lines 45 – 48 in accordance with the encoded motion vectors, of Sharma).

Sharma '079 teaches detection of motion vector between two successive image frames (e.g., Previous frame and Current Frame as shown in figs. 2 – 5), which are before and after interpolated frame.

Although Sharma '079 teaches using successive image frames (i.e., Previous frame and Current Frame as shown in figs. 2 – 5) located before and after interpolated frame, Sharma '079 is silent in regards to explicit of "<u>plurality of image frames</u> that are located either before or after the interpolation frame in the display order".

However, Demos '004 in the same field teaches (please see; figs. 5 and 20 - 22, page 2, paragraphs 0025, 0030, page 4, paragraph 0051 and page 8, paragraphs 0120 – 0122) the use of plurality of image frames as a reference frames that are located before or after the interpolation frame in the display order (i.e., noted in Figs. 5 and 21, that the plurality of "P" frames are located before or after the interpolated "B" frame; see paragraphs 0005 and 0028).

In view of the above, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the video frame interpolation process of Sharma, in accordance with the teaching of Demos by using plurality of image frames (i.e., P frames) as a reference frame which are located either before or after the interpolation frame (i.e., B frame) in the display order, in order to improve the image quality of one or more predicted frames in a video image compression as suggested by Demos (i.e. page 2, paragraph 0020 of Demos).

Contact

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Behrooz Senfi whose telephone number is 571-272-7339. The examiner can normally be reached on M-F 7:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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